

*Carpenter (Ward) & Son.*

REPORT  
OF  
MESSRS. WARD CARPENTER & SON,  
ON THE CONDITION OF  
**THE RIVER FRONT**

OF  
TARRYTOWN, IRVINGTON, AND DOBBS' FERRY,

AND ON THE  
SCHOOL BUILDINGS IN THE TARRYTOWN, IRVINGTON,  
AND DOBBS' FERRY DISTRICTS;

TOGETHER WITH  
COPY OF A LETTER FROM GEORGE BAYLES, Esq.,

AND AN  
EXTRACT FROM A REPORT OF MISS TODD,  
AS TO THE PERSONS IN DOBBS' FERRY WHO ARE NOW SUFFERING, AND HAVE  
RECENTLY SUFFERED, FROM MALARIAL FEVER.

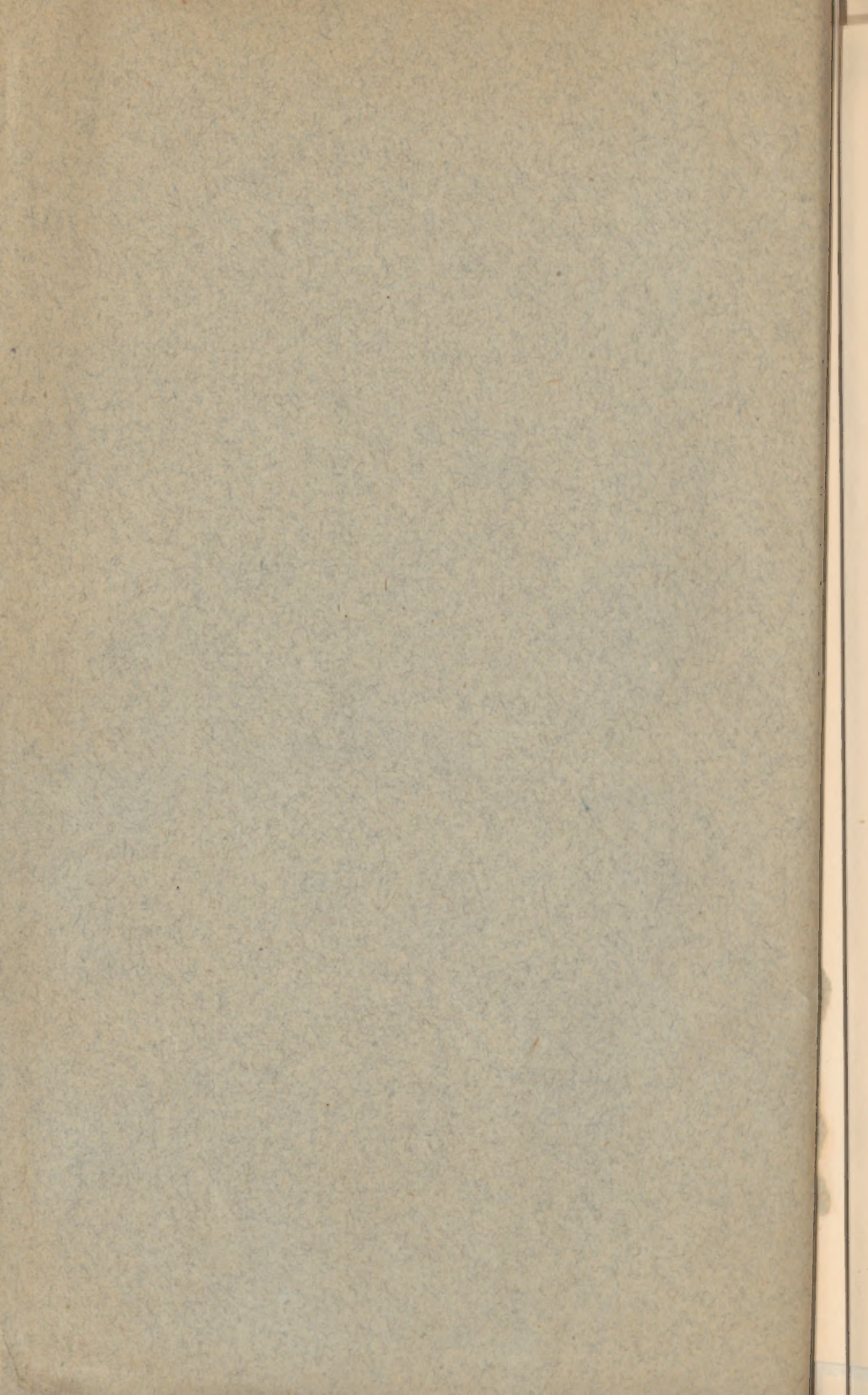
ALSO,  
LETTERS FROM MR. W. A. ROSS, MR. JOHN W. MINTURN, DR. J. B.  
FULTON, MR. A. C. RICHARDS, AND DR. C. PRINCE.

*New York:*

J. W. PRATT, BOOK AND JOB PRINTER, 75 FULTON STREET.  
1878.

*This Report is printed for private circulation only, and Mr. Cyrus W. Field will feel much obliged if you will read it carefully and return it to him with such comments as you may think proper to make.*

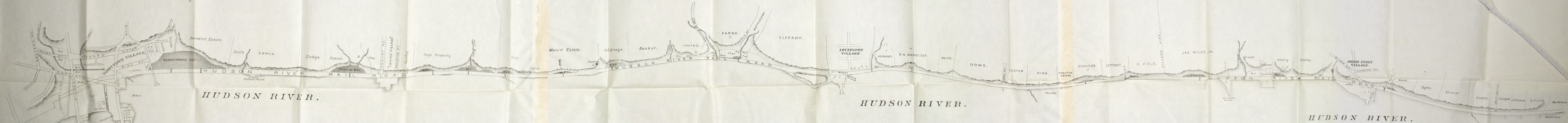
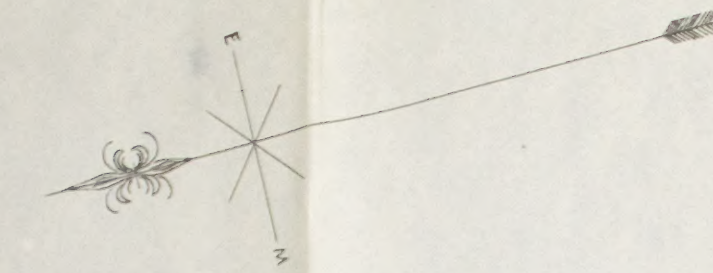






MAP OF THE  
RIVER-FRONT  
OF  
TARRYTOWN, IRVINGTON & DOBBS FERRY,  
Westchester Co., N.Y.

Scale 400 Feet per Inch.  
WARD CARPENTER & SON,  
CIVIL ENGINEERS.  
Sep: 13<sup>th</sup> 1878.





Hudson Hall



Strand

REPORT

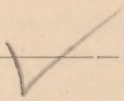
ON THE CONDITION OF

THE RIVER FRONT

OF THE VILLAGES OF

TARRYTOWN, IRVINGTON, AND DOBBS' FERRY.

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By WARD CARPENTER & SON,  
CIVIL ENGINEERS.

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NEW YORK :

J. W. PRATT, BOOK AND JOB PRINTER, 75 FULTON STREET.

1878.



## THROUGH TARRYTOWN.

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From the railroad station a low tract extends eastward and northward. That to the east was once a part of the river bay, having been filled in artificially since the settlement of the village, and some of it quite recently. To the north, along the valley marked by André brook, there is reason to believe that an arm of the bay once extended up as far as College avenue where the brook comes in from the east, making now an abrupt turn. At this bend was undoubtedly the original mouth of the brook, and all that part of the low tract immediately adjoining its present banks is formed by deposits of silt, and the subsequent growth and decay of aquatic plants.

This part is now especially low and wet, some of it being less than two and a half feet above high water, and when extra high tides and storm freshets come together, these portions are overflowed. Even in those parts of this valley that have a higher average of elevation, indications of the swamp origin are quite apparent. To this naturally bad condition are added the evils of a want of drainage and sewerage, a want common to the whole village, but of course more seriously felt where there is such a wet subsoil, and where there are so many stables and houses of a tenement character.

In the gore, north of Wildey street, there are 14 privies and two stables that closely adjoin the brook, some of the privies being directly over it. South of Wildey street there are many more such annoyances, especially stables; besides a branch brook with a very bad drainage area



comes in from Central avenue. Down along André brook, near the south end of New street, is the pump house for supplying water through the streets for fire purposes. If the water thus obtained were confined solely to this, the danger might be slight, but it is certainly objectionable to use it for sprinkling the streets by tapping the mains as is now done. One single case of typhoid fever or cholera in a tenement house above, might, through this channel, spread an epidemic over the whole village. It is unpleasant to think that the excrementitious germs of such a patient may even now be multiplying in some stagnant part of the pipes, to be scattered under the wheels of the carriage containing a convalescent driving out to get some pure air!

The village authorities should see to this matter, and moreover, it is high time that some steps were taken to obtain for the people under their protection a copious supply of potable water. We believe it devolves upon them also to look further into that section above pointed out, which is the only blot on the fairest village of the land. An accurate map and description of all the details, with the elevations above tide-water, should be prepared by them of all the land west of Orchard, Valley, and Water streets, with the view to arrange a system of drainage and sewerage for immediate adoption in this locality, and such as would be suitable as outlets for the less urgent sewerage of the entire village proper. It would be advisable for them also to establish a minimum grade line for basement or cellar floors. Nor would it be beyond their jurisdiction to issue an ordinance that every house built on this tract, where, it is well known, each such house nods over to its neighbor, should be protected from noxious effluvia by floors of concrete with a layer of asphalt, and by walls similarly treated.

For the present purpose we have deemed a bare mention of the general condition of this tract as sufficient. West of the railroad the land is much firmer and dryer,



though the average elevation is scarcely sufficient. In this vicinity are the Gas Works, and a slaughter house. The former is no evil except in so far as lime is used as a purifier. In other respects the shore line, adjoining "the point" is in fair condition. On the south, it perhaps ought to be noticed that the water is getting perceptibly shallower. The same conditions that produced the alluvial formation along André brook, east of the railroad, are now at work here, and it is only a question of time when there shall be a large salt meadow extending out as far as the line from the south end of the lumber yard to the outlet of the André brook culvert, taking in the rock that has stood sentinel there so many ages.

The railroad square is in fair condition, but between this and the old Requa dock is a bad spot, a remnant of the former bay. The filling-in of this portion is incomplete, and the materials already dumped are of a suspicious looking and smelling nature. South of this old dock comes the large bay, one of the largest of the many formed by the construction of the railroad. Its area is about eight acres. In the north east corner of this is also a former dumping ground, and although the systematic deposit of garbage has been wisely discontinued, much refuse and filth still finds its way here. Not the least annoyance and source of disease is a bad gutter coming in or rather scattering all over at this place. A large part of the time it is a running brook, and all the time it is a foul nuisance.

As for the bay itself, it is sadly deteriorating of late years. Long after the rail-road embankment was ruthlessly swept across this once noble bay, it preserved its reputation as a beautiful, clear sheet of water washing clean, sandy beaches, but to the careful observer signs were not wanting of a gradual though sure decline. The wash from the brook and hillsides and the waste from a growing village were no longer swept out to deep water: the currents were stagnated and the growth of water weeds



encouraged, which, by their decay and the imprisonment of the silt swept in by the tides, added largely to the accumulations from the shore. The beaches once lashed by the unobstructed waves of the easily ruffled Tappan Zee, began to disappear beneath a carpet of mosses and fallen flags. Whatever the causes, whatever the steps of the change, it is to-day an eye-sore, a foul-smelling spot, and a breeder of disease.

It would be a glorious day for this village if these 8 acres of mud and decay were filled up with clean gravel like the rail-road embankment. There is no use of undertaking the giant task, however, unless it be thoroughly done. This would imply a filling from the top of the rail-road bank on an ascending grade of one foot in two hundred, an average, perhaps, of 5 feet depth over the whole bay, amounting in all to somewhere near 50,000 cubic yards. Such an undertaking is by no means visionary. The total cost would not exceed 9,000 dollars. There surely must be some enterprising manufacturers who would expend this sum in converting the bay into terra firma, on condition that they should receive a title to a half, or some other portion.

Following the shore line southward, the next point worthy of note is a low and wet gore at the north-west corner of Mr. Dodge's place. If we are correct, the greater part of this is on the rail-road property, including the spring at north end. This little spring, together with the wash from the bluff and from the rail-road, keeps the ground saturated all the time, and as the outlet is unsuitable, there is some stagnation. This is a very little affair, but shows one of many great annoyances caused by the rail-road interfering with all the water fronts, built, as it so often is, with great disregard of the prior rights of the land-holders. Here is a wet place that requires filling. If Mr. Dodge should desire to make the improvement on rail-road land, he must not only get permission, but must use earth from their bank. With unlimited quantities on



his own premises he is precluded from using it by the intervening slope taken possession of by the rail road. There is scarcely a bank along the river where their lines will not be found to extend into it 50 or 100 feet. Had it not been for the rail-road embankment, the entire shore line of the three villages would to-day be a clean, healthy beach. Of course, we would not forget that while the land-holders have been so greatly inconvenienced, and, indeed, the health of many endangered, the grand result of the rail-road improvement is incalculable in the excess of the benefits to the villages and State at large over the drawbacks to a few; yet it would seem that this Company should consider what a valuable property they have acquired for a mere song, and be led to meet the individual land-holders more than half way in the many little points where their interests conflict, and especially should this Company be induced to take every possible precaution to prevent, and every possible effort to improve, the insalutary condition of affairs brought about by the erection of a dam, 144 miles in length, between the flow from the Hudson River water-shed and the river where it ought to discharge.

In front of the lands of the Misses Copcut and Mr. Robert Hoe is a bay of more or less evil influence. The experiment has here been tried of holding back the flow of the two brooks and shutting out the tide water by the erection of a dam across the only culvert provided by the rail road. The result has not proved altogether satisfactory, as the brooks are not sufficient in dry seasons to keep sweet a pond one-quarter of this size, besides, one of the brooks brings down the wash from three highways, the drainage of several stables and privies, and the sewage of several households. At present the gate in the dam is opened to admit the tide, but if the whole culvert was inadequate, this little opening is much more so. If the north brook could be kept pure, we should say that two more culverts might be constructed, one near each end, and the



bottom of the bay excavated so as to remain covered at ordinary low water. Considerable filling is needed back of the wall on west side, and the rail-road authorities could have no objections to others improving their land in this way.

Below the Irving Arch the drainage ditches on rail-road are in bad order. Opposite the stairway in front of the Cudde property the water in the ditch is especially foul, covered with that green scum which is inseparable from stagnation.

In front of the Hoge property are two very bad bays. The upper one is mostly filled up to the level of high water, which is worse than no filling at all. There is a rank growth of cat tails, alders and goose grass. The only outlet is near the south end, and is not only where it may do least good, but is small, poorly constructed and poorly protected: in fact, on the river side we could not find it at all. About 150 feet further south the other and larger bay begins. About 90 feet north of the culvert the bay is choked up and almost separated in two parts by material washed from the hillsides and by a dense growth of duck weed, goose grass and cat-tails, so that the water in the upper part is scarcely ever renewed. The culvert opposite the brook is good. The stream, known as Mill Brook, is rather large, draining a large area of territory including what was and still is known as Sheldon's Swamp. Its marshy origin is shown by the wine color of the water which tinges the river outside over an extent of five or six acres. Below the brook the bay is much the same as above. The growth of aquatic plants north and south of the brook forms parallel jetties through which its current flows without mingling with the stagnant bays on the sides.

At the south-west corner of this property commences another bay of the same or even worse character, which extends half way along the frontage of Mr. Terry's land. The culvert is poorly built and somewhat contracted. Be-



low the bay there is a damp overgrown and undergrown strip. If there is any doubt as to the benefit of cutting down noble forest trees, there is none whatever as to undergrowth. It is the latter that renders forests dank and unhealthy. The proper safeguard in this respect against the formation or harboring of malarial exhalations is to be found in clean, open groves, where every foot of the ground close to the trunks of the trees is covered with a healthy sod.

In front of the Merritt estate is still another stagnant bay, with the usual complement of cat-tails and alders. The culvert is very poorly constructed. A sewer pipe comes into this bay, and greatly increases the annoyance and the danger. It is no longer doubtful that the germs of cholera and typhoid fever, and other zymotic diseases, when passed into such filthy pools as these bays all are, increase to an unlimited extent. They are in their element in stagnant water. In this view it is easy to see how a terrible scourge might at any time arise from this practice of making the sewer outlets inside, instead of outside of the rail-road in the deeper and saltier water. As it is, passers by in the cars are not safe from infection.

Continuing southward we come to the bay in front of the Holdrege property. This is the worst of all. There is much more green and black scum here, and the water is fouler; there is undoubtedly a sewer emptying into this bay. Although we did not find it, the indications are plain. This, united with the stagnation, and with the dense overshadowing of foliage on the very steep margin, combine to render this bay peculiarly noxious in its influences. At the north end there is a low, level tract, rendered damp and hideous by undergrowth which affords a shelter for much refuse, including not a little animal filth. When are all these places to be filled up and cleared up, and converted into cool (but not dank) groves and smiling lawns, which the passer-by would no sooner soil and desecrate than the steps of the altar?



Passing the Banker property, where measures are being taken to thin out some of the trees, and where the shore line is good, this being one of the few places that pour water on to the railroad instead of receiving it, we come to the two Irving flats. In the upper one the filling averages nearly three feet, but as there is no outlet for the rain fall, the subsoil is constantly wet. Near the rail-road the water may be seen standing in the old post-holes within ten inches of the surface. As a consequence there are some traces of aquatic growth, and this lawn cannot be absolutely healthy. A tile pipe should be laid, six or eight inches at the south end above the level of high water, and sloping gradually northward to high water at the culvert near the north-west corner. This should be supplemented by branch tile every 45 or 50 feet, running up to the foot of the bluff. In the south flat the filling is not as high as above, but the better surface grade and the more convenient outlet render this nearly as dry as the other. What it wants, however, is a good foot of soil, and then a few tile may be laid to the brook on the south to complete the improvement.

## II. IRVINGTON VILLAGE.

The boundary line between Tarrytown and Irvington strikes across the flat last mentioned, not far north of the Sunnyside brook. Directly south of this brook and first in the Irvington village, comes the Fargo flat, which was filled in two winters ago. Those portions of this which were established as a final grade, viz.: the eastern and south-eastern portions are in very fine condition, and embrace  $1\frac{1}{2}$  acres, or nearly half of the whole filling. A fair crop of oats and also a fair crop of clover have been taken off this season. The northern and western portions have settled firm, but require from one to two feet more filling, at the very least. The bad ditch on the west is on the rail-road property, and this is such a nuisance that the com-



pany should be required to fill it in forthwith. It was no ordinary undertaking to excavate and move 20,000 yards of material in one winter, and the old "Crow's Nest Point" gave out before yielding a sufficient supply for Mr. Fargo's own wants, much less for the railroad company's. During the progress of the work suitable tile were laid along the old shore line to catch the flow of the numerous springs at the foot of the high ground, and these pipes have served their purpose with increasing effect. The sewerage was also provided for. Now, that the filling has settled, another line, and of cheaper tile, might be carried northward and southward to the two brooks, at a distance of 60 feet west of the first. Beyond this, reliance must be placed on surface channels until the filling of the bay is brought up to a suitable height. When this is accomplished it will be speaking within bounds to declare this the finest lawn along the river. Although no serious illness has been experienced of late in the Irving or Fargo cottages, and both of them are occupied, we nevertheless deem it as part of our duty to add that the completion of the improvement is not only called for by æsthetical considerations, but sanitary, as well.

Mr. Matthiessen's front has been filled in for twenty years or more, but the larger part of it is much too low, being from three to five feet lower than the finished portions of Mr. Fargo's front. The former contains a pond for overflowing in winter, surrounded by an embankment. This embankment is not an inch too high for the required filling of the whole flat. East of the embankment the ground is particularly wet for about half an acre. To put this property in good healthy condition, including the filling of the pond, would require from 1,500 to 2,000 yards, which would cost, if obtained from the bank on the east, from 300 to 400 dollars.

The bay in front of Mr. Tiffany's land has been filled in for five or six years. It lacks from one to two feet of being high enough. The water now stands on the sur-



face along the railroad fence. At the south end the filling has been scantied worse yet, so that there is often a foot of stagnant water, with no outlet provided. Upwards of 2,000 yards of good soil is yet needed to put this fine flat in a thoroughly sound condition, with a three-inch tile carried northward and southward along the railroad to outlets through the railroad embankment at each end.

South of this the shore line crosses to the west of the railroad, where there is a good beach as far as, and including, the Irvington Landing. The corner formed by the south line of this dock and the west line of railroad is used as a dumping ground. This is by no means a benefit to the health, the looks, or the general credit of the place. There are also two sewers, or gutter pipes that come in at this point. The slops from these often collect in the little trench formed east of the garbage heap and increase the nuisance. When every possible or probable source and hiding place of disease is being sought out, these things should be better ordered. The danger is not only present, but years hence ground thus made may give up malarious or other noxious gases arising from the smothered fermentation of the hideous contents.

The north-west corner of the A. H. Barney property has a wet spot near the railroad, which would be greatly improved by adding a foot of loam, and afterwards under draining. At the south end of this low gore, water stands on the surface under the railroad fence, and a few flags may be seen. The wash from the railroad and from the bluff goes into this low place, and no outlet is provided. A small tile drain, carried up to the brook, would create a great change within 30 days. It could be laid 18 inches deep, which would be sufficient whenever this flat is brought up to the proper grade.

In front of the D. N. Barney property a bay of considerable size was filled in about eleven years ago. The intended minimum height was  $2\frac{1}{2}$  feet above high water, but



the north part has settled somewhat, so that it is barely two feet in some places. North of the culvert, water stands on the surface, and some aquatic plants are found. South of the culvert the appearance is better, except at the extreme south end, where there are again traces of stagnant water. The simple remedy here required is a two inch tile, leading from both ends of this flat to the culvert in middle. To make a handsome and healthy lawn of it, a worthy set-off to the remarkably fine terrace, the filling should be brought up to the level of railroad embankment. There is an abundance of material in the bluff on the south which ought to be graded off in continuation of the present terrace.

The frontage of Messrs. Mairs, Dows, Foster and King is all in good, and in some cases, excellent order. In passing, it may be noticed that there are two sewers emptying into the river south of the old Abbotsford dock, the outlets not being well arranged. The sewerage falls on a heap of large stone, bare at low water, and is often held between the interstices until the rise of the tide, and indeed longer; a result aided by the confined space formed by the railroad wall and old dock. There is going to be a large increase in the number of such conveniences henceforth, and it will therefore become an important matter how the outlets are arranged. The principle should be laid down at the start, that every sewer pipe must be carried out beyond low water mark, and debouch in an open space where the tide has free range.

On the railroad land in front of Mr. Schuyler's, there is a narrow strip subject to ebb and flow of tide. The water is stagnant, as it is quite impossible for a single culvert to supply sufficient water thoroughly to premeate the portions remaining near each end of the long strip, especially when impeded by the thick growth of cat-tails. Mr. Schuyler's wall is two feet high above ordinary high water, the surface of his flat rising moderately to the foot of the upland. For this slight elevation it has a decidedly



good appearance, which is undoubtedly owing to its being well under-drained. As for the strip on railroad, it is in very bad condition, and liable to a well founded complaint to the Board of Health.

In the north-west corner of Mr. Dudley Fields' land is the remnant of another bay. The portion in front of Mr. Cottenet's land has already been well filled in. The part remaining is in very bad condition, the water being stagnant for the same reasons as in so many other similar cases—want of convenient outlet, and interference and decay of aquatic vegetation. It would not cost more than 250 or 300 dollars to fill in this bay three feet above tide water, provided the material could be obtained from the adjoining bluff, which it seems is pre-empted by the railroad company. The rest of Mr. Dudley Fields' frontage is in good condition as respects drainage, being rendered so by the steep bank referred to.

### III. THROUGH DOBBS' FERRY.

The Irvington village limits terminate at Mr. Dudley Fields' south line. Entering the Dobbs' Ferry or Greenburgh limits we find a bad bay commencing 100 feet south of Mr. Wilde's corner. The margins are clogged with cat-tails. The surface is covered with a green scum, foul in itself and breeding foulness. The culvert for this bay is much too near the south end for a single opening, and is much too small, being not more than 18 inches square through the new part of the railroad embankment. In many places along their line are just such evidences of want of care in this matter of drainage. The company is ever ready to turn their wash-off to the east, when a very little additional expense, if any, would throw it the other way, and yet they seem unwilling to provide suitable openings for the discharge of all this flow, and for the run-fall upon places rendered low solely by their dam. Instead of an 18-inch hole for this bay there should be two



large 8-foot culverts sweeping the waters of the Hudson in and out four times a day. In other words, the present provision is only one-sixtieth part of what it should be. Either this enlargement will have to be made, or the bay will have to be filled up, for as it now exists it is a breeder of disease, devoid of the least beauty or any other mitigating element.

We come next to the old Willsea Dock. North of this there is a handsome bathing beach, but south of it, in the space between it and the Biegen wharf, a delta is forming from the silt of the Willsea brook, deposited here by the natural action in such cases where a shelter is formed from tidal currents. This, and its counterpart at the mouth of Andre brook at Tarrytown, are the only two places on the *outside* of the railroad that are in any ways in bad condition, and even in these two sole cases the danger is in the future, and not now tangible.

The low, wet place, north of Mr. Biegen's distillery, has been noticed by us in our Report on the Willsea brook. The interest that has been aroused in these matters, and the prompt and thorough action that will doubtless be taken by adjoining owners may lead also to the raising of the grade at this place. If this would be desirable, the filling in of that portion of the original bay yet remaining, viz.: on the south of Mr. Biegen's works, and in front of Mr. Kitching's land, is absolutely and urgently demanded. This part is cut off from the sole culvert provided for the original bay by the filling in of Mr. Biegen's land, which embraces the middle portion. If an eighteen-inch hole, and, indeed, a single large culvert does not prevent stagnation, as we have seen above, what then must be the state of affairs when, as here, there is no outlet at all? It could not be otherwise than is here the case, a reservoir of concentrated foulness, exceedingly dangerous to health. An attempt has evidently been made, at some time, to fill in this bay, but the filling barely reaches within six inches of high water, so that the soil is always saturated and gen-

erally covered with a thin film. The drainage seems to be into a deeper place, a little north of the engine house, which has the precise appearance and odor of a large cess-pool. Attention should be directed to this immediately. Besides the Wilde Bay, this is the only very flagrant annoyance along the shore line within the Dobbs' Ferry limits.

At the south part of Mr. D. O. Bradley's place, is a flat gore, inclined to be damp, which, if raised six inches near the railroad, and one foot at the foot of the bluff, would require no further attention.

At the Dobbs' Ferry station, the shore line is good, but there are three water tanks on the railroad property that ought to be frequently cleaned by the company.

In front of Dr. Pooley's place, below the bridge-crossing, the old bay has not been filled deep enough. Both this and Mr. Arent's front, next south, are in bad condition, having deteriorated within the last few years.

For the remaining distance down to the south boundary of the village, which is the south line of the Bowen property, the shore line is in fair order as respects drainage. It is about here that Tappan Bay ends, and the mighty Hudson sweeps with a more rapid current between narrower and more precipitous banks. We have thus before us a succinct review of the entire river frontage of five and one-third miles. The situation resolves itself into this: along the eastern shore of Tappan Bay there were numerous indentations and projecting points, until in 1847-8-9 the railroad company having obtained the right of way, cut through the points and carried the material in an embankment across the bays, converting the sinuous shore into a chain of stagnant pools from Hastings to Peekskill. The railroad is an established fact. It is here, it is going to stay here, and it is a good thing that it is so. Instead of animadverting against the company, the situation must be accepted, and the best made out of it that is possible. In the end the result will be favorable in every respect,



as it has already proved in the growth of our three villages. Instead of reviling, the time will come when we shall have reason to be thankful that this company has built such a fine sea wall for us, of such fine material, and taught us how high to strike the level for our shops and dwellings. There will come a time when Tappan Bay will be bounded on the east by an unbroken barrier, against whose perpendicular front it may dash, and along which it may rise and fall, but beyond which not a wave shall advance; a barrier, not like the Thames embankment, with thousands, hundred of thousands of acres behind, liable at any time to a devastating flood, but with upward slopes rising uninterruptedly for 400 feet. No pumps will be needed to raise sluggish waters or oceans of sewage, but along the whole line the storm floods will freely trip down the hill-sides and *over* the railroad in such quantities that the company will be compelled to put sluice-ways in every fourth space between the sleepers. Throw their water on us indeed!

WARD CARPENTER, & SON,  
*Civil Engineers.*

TARRYTOWN, N. Y., Sept. 13, 1878.

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BEARSVILLE, P. O., ULSTER Co., N. Y.

August 22d, 1878.

CYRUS W. FIELD, ESQ.,

*Dear Sir:*—Permit me to thank you for your very kind response to my letter, and for a copy of a report of the proceedings of your Social Club at Irvington. I have read the pamphlet with the greatest interest and with a lively appreciation of every sentiment uttered in debate by gentlemen with whom I have been so well and pleasantly acquainted in years gone by. There are a few points in Col. Waring's report, of June 7th, 1878, which I feel com-

petent to review in the spirit of candid, friendly criticism, feeling that my term of residence in, and practical sanitary relations to, Irvington qualify me so to do. Observations made with reference to fever and ague malaria (such as Col. Waring's chiefly were) may be said with confidence to be as applicable to all kinds of terranean miasms as for that special form of poison.

Drainage and ventilation will dissipate all known varieties of malaria and leave the regional conditions favorable for the efficacious employment of such medicinal agents as are commonly relied upon to neutralize these poisons. I think Col. Waring started with an erroneous assumption when he says, "Assuming, as I believe one may safely do, that fever and ague is not indigenous in the Irvington neighborhood but has been brought to it, so far as it exists there, by the importation of cases of the disease, we have to look for such local conditions as would foster it and lead to its reproduction and localization."

Since a certain time, not difficult to specify with some accuracy, the poison of ague malaria, as well as other miasmatic poisons, *have become* indigenous in the Irvington neighborhood. The importation of cases of fever and ague is not a factor of any importance, nor indeed, in a scientific sense appreciable as a germinal influence in the local production and continuance of the evidences of that poison. Fever and ague is not a disease communicable from person to person, let the local conditions be what they may. Like circumstances are liable to produce like effects, but ague malaria depends solely upon the circumstances, and not at all upon the fact of one or more persons having the disorder in any of its diverse manifestations. Each case arises from its own individual perceptibility and the appropriateness of the exposure.

Inception of the disease depends not mainly but wholly upon the presence of the specific poison. Its more or less permanence in a given neighborhood is due to the favorable nature of its reception, the acquired susceptibility of



the inhabitants, and of the somewhat negative effects of medical treatment while the causes remain in force. Now I can testify to the inception of the disease in many cases in or near Irvington suddenly, nearly simultaneously, and immediately following a prolonged period of absolute immunity.

I suspect that that period of healthfulness had never been previously interrupted by such an invasion of unhealthful influences as have since existed.

What is true of fever and ague in this connection is also true of the zymotic diseases in anything that might be called an endemic visitation. This class of disease bloomed into fatal prevalence at about the same time. In the light of an historical fact, such as I allude to, it is fair to presume that the causes for the prevalence of fever and ague, in the district surrounding Irvington, are local in their origin, local in their sources of maintenance, and demand local measures for their removal. It is an important point, and one that relates to other diseases of a malarial origin as well.

Col. Waring is right in all that he has found and reported relating to the defects of the district in a sanitary sense. And his recommendations are of the first importance in an attempt to remedy the evils complained of. The elemental, or original cause of the localization of these malarial disorders has not altogether escaped the notice of Col. Waring, but he has not recognized it as the primary cause, and possibly the *sole sufficient* cause of all the malarial diseases that have afflicted Irvington. He has not given it that prominence, in his estimate of dangers, that I think it is entitled to.

Col. Waring says: "So far as my examination warrants me in forming an opinion, I should say that there do exist, more or less, throughout the whole district examined, sufficient resting places for the infection, associated with conditions which would naturally lead to its propagation. I think that it may be safely assumed that a detailed ex-

amination of the ground would lead to the discovery of these unfavorable spots and that it is possible to remove them. At the same time it must be understood that this opinion is not based on positive knowledge for *such knowledge does not exist.*"

On the contrary, I think it may be safely assumed that in respect of Irvington, such knowledge does exist, and that it is a knowledge which if rightly employed will result in the elimination of the malarial diseases (as indigenous affections) entirely from that district. The topographical conditions which characterize the district lying between Tarrytown and Dobbs' Ferry do not differ very essentially, at the present time, from what they did before the invasion of malaria, excepting in one important particular, and that is one of such grave importance that I deem it the prime cause of all that has so unfortunately blighted (temporarily I hope and believe) the fair fame of Irvington.

Without further preamble, which I could not well avoid in discussing Col. Waring's report, I would say that the locality which gave rise to the first symptoms of indigenous malaria, was the strip of land or water, as the case might be, lying between the railroad and bluff land which originally formed the shore line of the river. Until the railroad authorities widened the road-bed to accommodate a third track, nothing of a malarial character was known in Irvington between the North river and the water shed of the Saw Mill river. The enlarged road-bed was done with reckless haste, and without any regard to the drainage culverts which before had allowed the tide to ebb and flow freely between the railroad bank and the river bank. As soon as the road was finished the pool spaces were the receptacles of all kinds of drainage or sewerage from dwellings as well as from stables and stockyards, and nothing was received from the river to neutralize, in the least degree, the gradual condensation of its retained filth, and the gases of its vigorous decomposition. This was



especially true of the swampy pool at the base and just south of "*Sunny-Side*," at the foot of Mr. Fargo's place, also at the foot of Messrs. Tiffany and Dunham's places, at the river margin of Messrs. D. N. and A. H. Barney's places, and then in various places nearer Dobbs Ferry. No sooner had this change upon the railroad completed the sanitary undoing of the river edge of Irvington, than the first cases of diphtheria occurred. Two cases occurred in one family—fatal in one case—within fifty feet of the margin of one of the obstructed pools, and within less than a hundred feet of the railroad station of Irvington village. In a few days another case of diphtheria occurred in the first street of the village lying north of and parallel to the railroad. That case proved fatal. Two or three other cases of the same disease occurred before frost set in, and after that, until the spring following, there was a remission. At the same time with these diphtheria cases, there occurred several cases of serious illness in the lower part of the village, which were anomalous in their peculiar severity, and the malarial symptoms that accompanied them were marked. Bilious remittent fever, typho-malarial fever, neuralgias of the most unprecedented character, having periodicity in their paroxysms that showed plainly their nature and origin. This was all new to the Irvington region, and hence, had a meaning and an assignable cause. About that time a case of confinement of a lady residing for the summer in "*Sunny-Side Cottage*," lapsed into malarial coma and destroyed the patient. Another case of a similar nature occurred on the main-road (Broadway) between the McVicker lane and Sunny-side lane. These two cases were peculiarly characteristic of malarial toxasmia, and such cases had hitherto been unknown in Irvington. I could relate the particulars in detail, of a great many cases both caused and influenced by prevalent malarial at this period. Since that time there has been no intermission in the prevalence of miasmatic infection in the neighborhood, creeping along

north and south from the starting point at Messrs. Durham and Tiffany's river front, and also extending slowly up the hill towards that point just over the crest, where the malaria arising from the ill-drained lands of the Saw Mill river valley may be met.

To establish a *cordon* of malaria from the weakened waftings eastward from the New Jersey shore to the long-infected fever district of the Saw Mill river section has been the work of the railroad constructors, and this work must be undone, as far as its sanitary defects are concerned, before any relief may be expected for Irvington. That village and its environs have a natural right to be as free of malaria as any other in the land. It has been so up to a time when a thing was done that instantly put a period to the immunity which it had heretofore enjoyed. Is it not plain that the cause is definable, and at the same time removable? Is any other sanitary defect worthy to be compared in gravity of circumstances and direct effect with the one I have described? Filling up of these pools has recently, or within about five years, been done in a way that makes hard ground of what, in the time of my residence in Irvington, were basins of water many acres in extent. This was the fact with the pool at or near "Sunnyside," and at the foot of the grand lawn of the Barney estates. This filling has improved the neighborhood only to the extent that the subsoil drainage has been perfect, and ancient sewerage drainage discontinued. I have reason to believe these conditions have been practically overlooked by the contractors for the filling. If not actually disregarded, they have been done in a way to be non-effective and to aggravate the original trouble. With this outline statement or hint of what I regard as the chief fatal defect in the sanitary condition of Irvington, I ask you to test the soundness of my views in a way that will settle the question beyond all doubt. I feel that I owe this statement to the good people of Irvington for



whom I have, for numberless kindnesses received, the most affectionate regard.

I have the honor to be, dear sir,

Your obedient serv't,

GEORGE BAYLES.

TARRYTOWN, N. Y., Sept. 6, 1878.

CYRUS W. FIELD, Esq., President "Irvington Neighbors."

*Dear Sir:*—As directed by you, we have made measurements with regard to the school buildings and surroundings in the Dobbs' Ferry, Irvington, and Tarrytown districts, and have the honor to submit the result herewith:

FIRST.—SCHOOL ON HIGH STREET, DOBBS' FERRY.

The grounds are 121 feet by 120. The north-western exposure is cold, but in a measure counterbalanced by the eastern and southern aspect. In respect to access of free air, this school is more advantageously situated than the others, though as regards *pure* air, we fear that must remain an open question.

Surrounding this school are the following named nuisances: (1.) Privy in the northwest corner of school yard, 72 feet distant from nearest windows of school house, and 63 feet from pump. (2.) Privy on west part of yard, 65 feet from nearest windows, and  $47\frac{1}{4}$  feet from pump. (3.) A double privy, back of north-west privy about 88 feet from nearest window. (4.) A double privy, back of west privy, about 82 feet from nearest window. (5.) A privy on next lot south, 75 feet from nearest window. (6.) A privy on the lot still further south, about 100 feet from nearest window. (7.) A privy north-west of school yard, about 150 feet from nearest window. Nos. 3, 4, 5, 6 and 7 are on ground much lower than school yard, the lots having double houses which are of the tenement character.

(8.) A privy, also double, on the lot immediately north of school yard. This is far worse than any of the others. At the back is a refuse heap of disgusting character alone, and made infamous by the bursting out upon it of the privy contents. This privy and refuse heap demands immediate condemnation by the Board of Health.

As there had been a heavy rain fall the night previous to our visit, all the privies gave forth a horrible odor.

We did not ascertain whether it was a well or cistern under the pump. Whichever be the case, provision seems to have been made for its ventilation.

#### SECOND.—IRVINGTON VILLAGE SCHOOL, NORTH OF ATHENEUM, ON EAST SIDE OF E. STREET.

Northwestern exposure, ground sloping westward, as in Dobbs' Ferry and Tarrytown schools, and, as in the latter case, the eastern frontage is shut off by high ground on the east. Openness to the south is better.

The nuisances are as follows: (1.) Girls' privy 40 feet north-east from nearest window. (2.) Boys' privy, 34 feet south-east from nearest window. (3.) Privy on Atheneum lot, 53 feet south-east. (4.) Covered cesspool on Orton property, 39 feet south-east.

The well is in south-west corner of lot. The distance from each of the four points mentioned is as follows: (1.) From girls' privy, 160 feet. (2.) From boys' privy, 77 feet. (3.) From Atheneum privy, 87 feet. (4.) From Orton cesspool, 100 feet.

The cesspool is constructed of open stone work, nearly up to the surface, where a few courses of brick are laid in cement for the spring of the arch. This, and the three privy vaults, are on ground much higher than the well.

The well also receives the surface wash. A considerable part of this wash works along the south fence and receives a quota from an ash heap on the Atheneum lot and about 62 feet east. An ash heap is not only always mixed with more or less garbage, but is also a ready absorbent of im-



purities from the air. During storms, there is quite a stream that pours into the well through a considerable opening in the mason work on the south side of the well.

A drainage pipe from the east of the school house also passes within seven feet of the well. As it is laid with open joints, this increases the danger of defilement. This pipe, we should judge, is intended to drain the high ground, east of school house, to protect the basement and also as an overflow for a cistern there. This water may often be impure through stagnation, and as the open pipe is in some places near the surface and washed bare in others, many impurities will find their way in directly. This pipe, moreover, passes within 30 feet of the cesspool and 21 feet of the boys' privy. Under such circumstances there would always be more or less filth collecting in the pipe and injurious gases produced which at any time might escape into the well, but especially in case the outlet, which is not safely arranged, should get stopped up.

#### THIRD.—SCHOOL ON SHELDON AVENUE, WEST OF MEADOW STREET.

The privy is 26 feet west of nearest window. Part of the vault is now above ground and built of open stone work.

No well on the premises.

Water is obtained from the first lot built upon north. The well on that lot is 65 feet east of a privy and 71 feet east of a cow stable. The surface wash is towards the well.

#### FOURTH.—TARRYTOWN SCHOOL, EAST OF BROADWAY AND SOUTH OF FRANKLIN STREET.

The well is under the side-walk near the curb.

There are three privy vaults on the high ground back of school house. That directly behind is 13 feet from rear wall of school and about 15 feet from the nearest window. The south-east privy is 29 feet from nearest window, and 27 from corner of building. The north-east

one is about 17 feet from nearest window. The well is 163 feet from south-east privy and 156 from the middle one. It is separated by the masonry of the Croton aqueduct which passes under the school yard to the depth of about 15 feet in all. It is doubtful whether this is effectual as a protection. The distance from privies contrasts favorably with the other cases, but the descent towards the well is much greater, while there is besides a substratum of rock not far below the surface which would facilitate the connection. The latter is a very important item not only in the defilement of wells, but when extended over large tracts seriously increases the danger from terraneous poisons.

We are not called upon to offer any suggestions as to removal or remedy in the above cases, but we should be glad to state that in all other respects the four schools visited by us show many striking evidences that they are supported by intelligent and liberal communities, and under the supervision of capable and zealous boards.

We are, with the highest esteem, sincerely your obedient servants,

WARD CARPENTER & SON,  
*Civil Engineers.*

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*Extract from a report made by Miss Todd in regard to sufferers in Dobbs' Ferry from Malarial Fever, dated 21st Aug., 1878.*

"In the following list will be found the names of families who have *recently* suffered from malarial disease, and the names of those who are battling against it *now*. People have been, in several instances, unwilling to admit the presence of the disease where it evidently has shown itself. The trouble is that it is far more prevalent than it may appear to be from this list.

(Here follows a list of seventy-eight names.)

"These families reside between Mr. Wilde's and General



"Bowen's, in Dobbs' Ferry. They all have had the disease within a month, and many of them suffer from it at the present moment."

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The list of names, referred to above, was sent to a prominent gentleman of the Village of Dobbs' Ferry, and he returned it with the addition of the names of nine persons not included therein, making in all eighty-seven.

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DOBBS' FERRY, Sept. 18th, 1878.

DEAR MR. FIELD:—In reply to your inquiry I beg to say that, within the past three months, I have had in my household, under medical care, two cases of malaria and one case of pronounced chills and fever. None of the patients have been so affected before. The latter case was that of a servant, who has been only one year in the States, and but three months in my employment. Before coming to Dobbs' Ferry she had lived in Brooklyn since her arrival in the country. Heartily wishing you every success in your efforts to banish this plague of malaria from our hitherto very healthy neighborhood,

I am, dear Mr. Field, yours truly,

W. A. ROSS.

TO CYRUS W. FIELD, Esq., DOBBS' FERRY.

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GRINNELL, MINTURN & Co., }  
78 South street. }

NEW YORK, Sept. 17, 1878.

DEAR MR. FIELD:—I have read with interest the report you kindly sent me on the Hamilton pond, etc. There is no doubt in my mind that the *malaria* along the river bank is largely due to want of proper drainage. We live under malarial influences, and only by proper care

can escape the consequences. As evidence of this it is well known that the sod cannot be turned up to any extent near the house, on any place on the river, no matter how previously free from malaria, without danger of causing sickness.

Owing to the general commercial depression property is now entirely unsalable on the river or elsewhere, and therefore no time could have been better chosen to come out boldly and advocate proper sanitary inspection, with the object of taking steps to eliminate the causes of disease, as far as our present knowledge of the laws of health admit of it.

I am sure the community ought to be indebted to you for the energy you have displayed in turning attention to a matter which is of such vital public interest.

I am, dear sir, very truly yours,

JOHN W. MINTURN.

CYRUS W. FIELD, Esq.

CYRUS W. FIELD, Esq.

DEAR SIR:—I have carefully read the report on the condition of Hamilton's pond, etc., by Ward Carpenter & Son, and I think he has taken a very correct view of the subject so far as he has gone. There is no doubt of the fact, that enormous quantities of malaria are generated by the condition in which the ponds and streams, of which he speaks, are: and that the changes and improvements he proposes will, in a great measure, perhaps almost entirely, remove. But the work must not stop there. The subject of drainage and sewerage from cesspools and privies, and pig-pens and such, is of vast importance, and one that cannot be neglected if the health of the community is the object of consideration. The cesspool mentioned by Mr. Carpenter as forcing its overflow into the brook on Mr. Barney's property is sufficient of itself, during the hot months of July and August, to produce an epidemic of diphtheria that may extend through an entire



community, and which it may take weeks, perhaps months, to control.

Permit me to add, that I think you have begun this undertaking in the right way, and indeed, in the only way in which, if carried out properly, it can be successful. I think that all who are to-day doubtful will, in the next few years, be convinced of the correctness of your views.

Very respectfully,

J. B. FULTON, M. D.

Irvington, Sept. 17th, 1878.

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Report of condition of grounds adjoining the railroad track, between Tarrytown and Dobbs' Ferry:

1st. TARRYTOWN STATION.—Ground swampy and unwholesome, foul smells, and in a condition generally requiring attention.

2d. BENEDICT'S PROPERTY.—Open to tide, and apparently in good condition. I would explain here that my examination was made at high tide.

3d. SMITH'S.—In good condition.

4th. LEWIS.—In good condition—high ground.

5th. DODGE.—In good condition, with exception of north corner, where is a bad hole.

6th. STERLING.—Good.

7th. HOE.—Good. A pond of pure water, subject to flow of the tide, with culvert for overflow.

8th. HOGUE.—Swamp whole length from 10 to 20 feet wide. Cat-tails and flags. A culvert near north end for escape of water from brook, but stoned up with dry wall.

9th. TERRY.—Narrow swamp, whole length of property, perhaps 25 feet wide. A narrow culvert.

10th. MERRITT.—South good. Middle, long narrow swamp. Cat-tails and flags. A culvert needed here. North end a pipe drain, dry, apparently out of order.

11th. HOLDREGE.—Bad. Large swamp. Green surface to water. Cat-tails and flags, 100 feet by 300. Good culvert but not effectual for drainage.

12th. BANKER'S. Good all the way. High ground.

13th. IRVING LANE AND SUNNYSIDE.—Ground partially filled, but not sufficiently; low and unwholesome.

14th. FARGO'S.—Low and wet. Cat-tails and flags. Generally unwholesome. Culvert stoned up.

15th. MATTHIESEN.—Low ground, but has apparently been filled up; damp but not unwholesome.

16th. TIFFANY.—Good.

17th. IRVINGTON DEPOT.—Good. On the W. low and unwholesome.

18th. BARNEY'S.—North end, perhaps 8 feet in width, land some 6 or 8 feet below rail-road, culvert not closed by masonry, but filled up with dirt; wet. South end strip 10 to 12 feet in width, low and wet. Some bad smells here, apparently from drainage, but could not trace them.

19th. MAIR'S.—Good.

20th. DOW'S.—Good; culvert partially stopped with dirt.

21st. ROAD.—Good.

22d. FOSTER'S.—Good.

23d. KING'S.—Good.

24th. HAMILTON'S AND SCHUYLER'S.—N. end, for 200 feet, good; S. and middle, low, but partially drained to rail-road, where there is a wall, on the west side of which water stands the whole length, stagnant and covered with green scum; a good culvert.

25th. COTTENET'S.—Good; S. end low, but a good culvert.

26th. STYMER'S.—N. end, for 100 feet, low with cat-tails and flags, 10 to 15 feet in width; remainder high and good.

27th. WILD.—Very bad; swamp for 3 or 400 feet; green scum, cat tails and flags; culvert partially stopped; S. end high and good.

28th. PALMER.—A small swamp of an acre or two; remainder good.

29th. BIEGEN.—Low, but at N. end well drained to



culvert, and in good condition ; S. needs draining. Biegen says he has lived here over twenty years ; used to boast of its being the healthiest place in the world. The first case of fever and ague he ever heard of was in 1870, and since then it has been steadily increasing. The reason is very apparent. As population increases the amount of foul matter from residences increases, from the extreme carelessness of the poorer population and the stupidity of the better classes, who seem to think it only necessary to get foul matter away from their houses to accumulate at a little distance in a tenfold degree. One-half the wells in this vicinity are filled with drainage from cess pools and hog pens, and the best wells are rarely cleaned out. He has his cleaned once a year, and the last time found a dead rabbit in it. Such things are always liable to occur. It is a perfectly simple matter to get rid of the scourge if we have the disposition and the power. It need not stay here six months if we really want to get rid of it.

30th. KITCHEN.—Bad swamp.

31st. BRADLEY.—Swamp in part, some 10 or 12 feet wide.

I have found no evidence of any culvert having been stopped by the railroad, there being apparently all there ever have been through their embankment.

Resp'y submitted,

A. C. RICHARDS.

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IRVINGTON, N. Y., Sept. 20, 1878.

HON. C. W. FIELD,

Dear Sir :—I herewith return the report of the condition of Hamilton and other ponds by the Messrs. Carpenter. Permit me most heartily to commend its contents. It is just such a report as we might expect from so able and practical a man as we know Mr. Carpenter to be. His thorough knowledge of the locality renders him eminently calculated for the work which he has so admirably produced. Allow me, also, to return my thanks for the opportunity of perusing its valuable contents.

Mr. Carpenter simply advises in relation to the drainage, which was the main object, as I understand it, and in regard to which he has left nothing further to be requested of him. But I would ask the question, if the supply of water is as great as he calculates—and I have no doubt of it—why not make these natural reservoirs, complete as dispensing reservoirs, for the towns of Dobbs' Ferry and Irvington, supplying the inhabitants with an abundance of pure water, with drainage, not only for the nuisances of which he speaks, but also for each house and stable, and without which we have but half accomplished the great work, which you have so energetically commenced. Then our beautiful town would not only be desirable as a place of residence, but also for all those necessary conveniences, which every well regulated household feel to be indispensable for health and comfort. Also, in case of fire would be invaluable. At the same time, the undertaking would be profitable, not only in reclaiming now unproductive land, and preventing sickness, but also from water rents, necessary, in order to keep the improvement intact, and in good repair. We cannot have Irvington perfect without a thorough system of drainage, and which is impossible without water.

In regard to the cost of the work proposed by Mr. Carpenter, it seems to me he has underestimated the extensive plan which he proposes, but as I do not pretend to be an expert in such matters, I merely speak of it, lest we be disappointed when the bills come in. You know that operations of this magnitude cost more, as a general rule, than was first contemplated.

Permit me to conclude these brief remarks, with highest esteem for the energetic manner in which you have commenced this truly necessary work, and with my kindest regards as one of the "Neighbors."

Yours respectfully,

C. PRINCE.





